335483 FOOD TECHNOLOGY PROJECT

Ultrasound-assisted separation of eggshell membrane

การแยกเยื่อหุ้มเปลือกไข่โดยใช้คลื่นอัลตร้าซาวด์

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Abstract

Eggshells are co-product generated from the egg processing industry. One eggshell contains up to 10% of its weight in collagen. The extraction of collagen from eggshells serves both as a waste reduction measure in the industry and as a value addition to eggshells. In general, when separating eggshell membranes using acetic acid, a common problem often encountered is the low quantity of collagen. This is because the acetic acid immersion alone takes a long time up to 48 h, causing some of the collagen to leach out during the separation process. Hence, ultrasound is used to assist in reducing the acetic acid immersion time as it induces cavitation. The formation and collapse of countless air bubbles during cavitation can cause damage to the eggshell structure and eggshell membrane, which, in turn, reduces the acetic acid immersion time. The objective of this study was to compare the quantity of eggshell membrane collagen obtained from different separation methods of eggshell membranes: ultrasound in conjunction with acetic acid and acetic acid alone. The appropriate conditions for using ultrasound waves involved an amplitude of 80% and a total exposure time of 8 min, resulting in immersion time of 2 h, while acetic alone required 48 h. The yield obtained from this method was 9.71% ± 0.4, whereas using acetic acid alone yields 12.61% ± 1.39. Eggshell membrane separation using ultrasound in conjunction with acetic acid showed higher protein content of 84.66% ± 3.60 and hydroxyproline content of 0.68% ± 0.04 while acetic acid alone resulted in 81.08% ± 4.92 protein and 0.53% ± 0.06 hydroxyproline. After collagen extraction from both methods, the yield was 19.56% ± 0.00 and 22.67% ± 0.50, respectively. The collagen quantity extracted from using acetic acid alone is higher. The difference in yield did not correspond to the collagen quantity in the sample. Analysis of the protein pattern by SDS-PAGE revealed a band with a molecular weight of approximately 126 kDa, similar to the collagen type I.

Keywords: collagen; eggshell membranes; Ultrasound separation

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